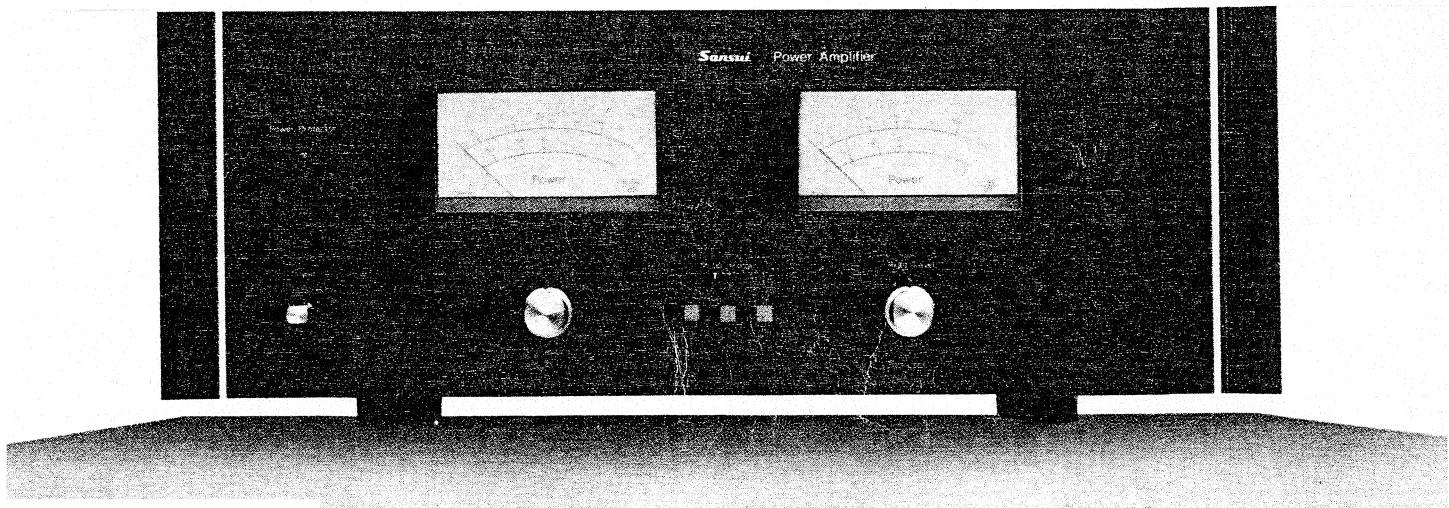


# SERVICE MANUAL

POWER AMPLIFIER  
**SANSUI BA-2000**



*Sansui*

SANSUI ELECTRIC CO., LTD.

# 1. SPECIFICATIONS

## POWER OUTPUT

Min. RMS, both channels driven, from 10 to 20,000Hz,  
with no more than 0.03% total harmonic distortion.  
110 watts per channel into 8 ohms  
Min. RMS, both channels driven, at 1,000Hz, with no more  
than 0.03% total harmonic distortion in stereo operation.  
115 watts per channel into 8 ohms

LOAD IMPEDANCE ..... 8 ohms

POWER BANDWIDTH ..... 10 to 20,000Hz at or below  
rated min. RMS power  
output and total harmonic  
distortion

## TOTAL HARMONIC DISTORTION

..... less than 0.03% at or below  
rated min. RMS power  
output

## INTERMODULATION DISTORTION

(70Hz:7,000Hz=4:1 SMPTE method)  
..... less than 0.03%

## FREQUENCY RESPONSE (at 1 watt)

..... 5Hz to 100kHz +<sup>0</sup><sub>-1</sub>dB

DAMPING FACTOR ..... approximately 70 at 8 ohms  
load

CHANNEL SEPARATION (at rated output, 1kHz)  
..... better than 75dB

HUM AND NOISE (IHF) .... better than 115dB

## INPUT SENSITIVITY AND IMPEDANCE

(1kHz, for rated power output)  
..... 1,000mV 50kΩ

## GENERAL

POWER VOLTAGE ..... 100, 120, 220, 240V 50/60Hz  
(U.S.A & Canada) ..... 120V (Usable 110-130V) 60Hz

POWER CONSUMPTION .. 910 watts (max.)  
480 watts 595VA (rated)

DIMENSIONS ..... 460 mm (18-1/8") W  
160 mm (6-5/16") H  
375 mm (14-13/16") D

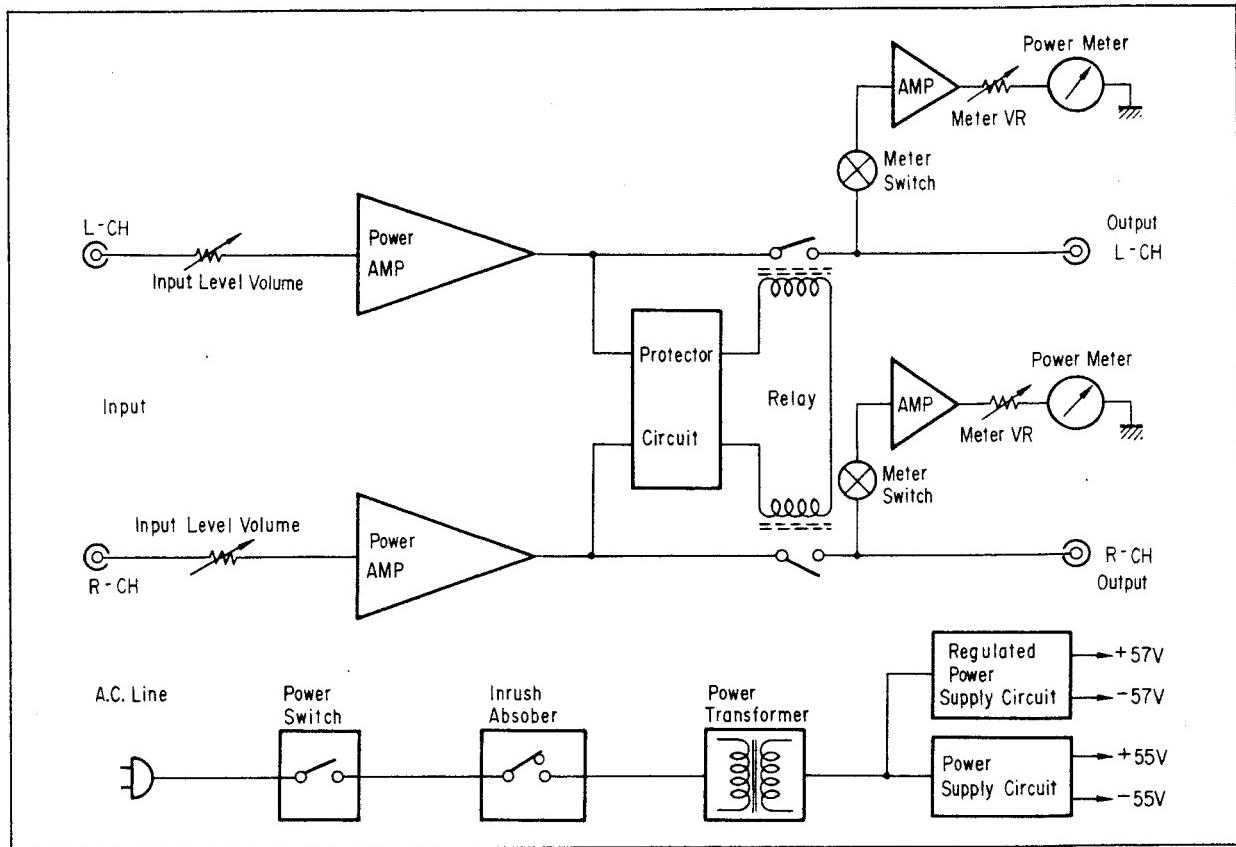
WEIGHT ..... 18.3 kg (40.3 lbs) net  
20.8 kg (45.0 lbs) packed

\* Design and specifications subject to change without notice for  
improvements.

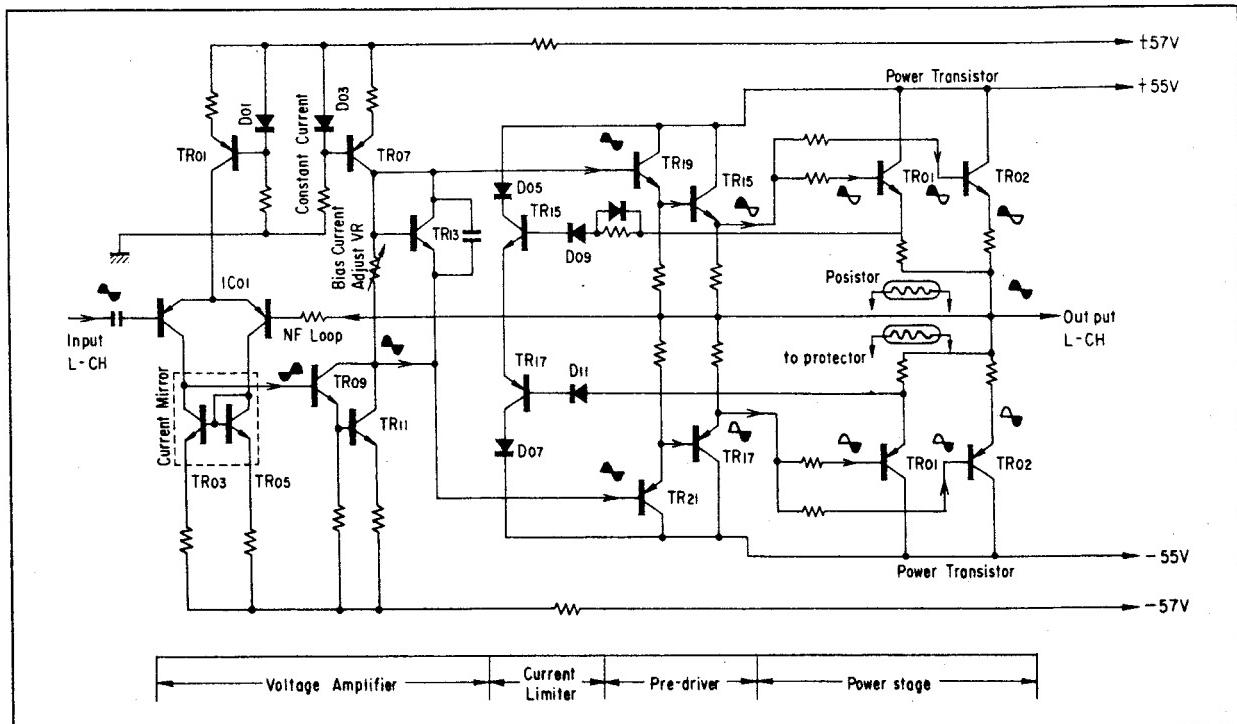
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## 2. BLOCK DIAGRAM



## 3. OPERATING DIAGRAM



## 4. OPERATION OF NEW CIRCUIT

### 4-1. Current Mirror Circuit

#### ◆ Purpose of use in # BA-2000

By adding current mirror section to balanced-type signal amplifier as Fig., the current mirror circuit is effective to improve signal to noise ratio, distortion factor and direct current stability.

#### ◆ Advantages

1. By operation of differential amplification in this driver stage, the current mirror circuit is efficient to reduce the influence of the power line voltage deviation and \*Common Mode Rejection Ratio (C.M.R.R.).

\* C.M.R.R. = Differential Gain  
Common Mode Gain

2. By basic functions of push-pull amplifier in this circuit, lower distortion factor is obtained.
3. Since the output impedance of this circuit can be kept extremely high, considerable high gain is obtained.

#### ◆ Operation

This Current Mirror Circuit is composed of two transistors, TR03 & TR05 as the current mirror section and a IC01 as the balanced-type signal amplifier as shown in Fig. The transistor, TR03, and transistor A of first stage built in the IC operate as a push-pull amplifier.

#### ◆ Phase Characteristics

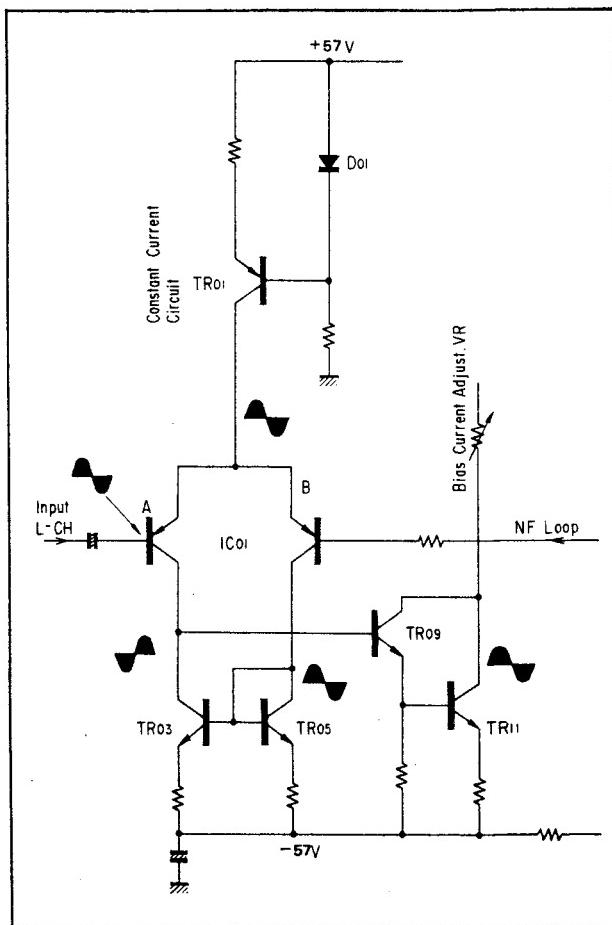
When input signal shown in Fig. is supplied to the base of the transistor A in the IC,

1. Out-of phase signal against the input signal appears at the collector of transistor A.
2. In-phase output signal against the input one appears at the emitter of transistor A.
3. Since the base of transistor B built in the IC is grounded in AC equivalent circuit, transistor B operates as the function of common-base circuit; therefore, the signal at collector of transistor B is in-phase signal against signal appeared at emitter of transistor B.
4. The signal appeared at collector of transistor B is given to the base of TR03. The signal appeared at collector of TR03 is out-of phase to the signal at collector of transistor B and is in-phase signal at collector of transistor A.

Thus, the combination of transistor A and TR03 is used as operation of push-pull amplifier.

#### ◆ Open Loop Gain

The open loop gain of conventional differential amplifier itself is approximately 30dB to 35dB in normal operation; furthermore, by adding the current mirror circuit in series to conventional differential amplifier, it is possible to obtain high open loop gain, approximately 70db to 80dB. Consequently, the gain 40db to 50dB, is able to add to negative feedback loop by using the current mirror circuit in order to improve distortion factors.



## 5. ADJUSTMENTS

### 5-1. Bias Current Adjustment (See Fig. 5-1, 5-2)

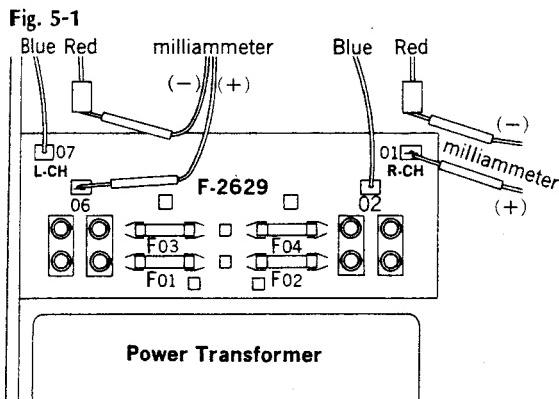
**Condition:**

1. Room Temperature ..... 18°C~28°C (65°F~83°F)
2. Output Load (Speaker) ..... 8 ohms
3. A.C. Supply Voltage ..... Rated Voltage ±2%
4. Turn down the volumes, VR01, VR02 on F-2661 till minimum (counterclockwise)
5. Level Volume ..... Maximum
6. For this adjustment, run this unit for more than 3 minutes after turning on the power switch.

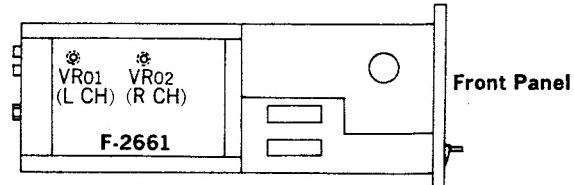
STEP	SUBJCS	AUDIO OSCILLATOR		OUTPUT TERMINAL	ADJUST	ADJUST FOR	REMARKS
		OUTPUT	CONNECTING POINT				
1	Distortion factors & Switching distortion adjustment	At 40kHz, Set the amplifier-output to 15V on both Channels by adjusting O.S.C. output level	Input terminal of amplifier	Speaker terminal 8Ω Oscilloscope Distortion Meter VTVM	VR01 (L-CH) VR02 (R-CH) on F-2661	Minimum point of Distortion factors & Switching distortion	To avoid temperature rise, complete the adjustment in a short time
2	Bias Current confirmation (no input signal)			D.C. Milliammeter	VR01 (L-CH) VR02 (R-CH) on F-2661	Confirm bias current to be within 100mA	Only being it over 100mA, Set it to 100mA

**Note:** After proceeding with Step 1, have a cooling off period, 5 to 10 minutes, to confirm the bias current.

In case of not having a distortion meter, complete the adjustment by Step 2 to obtain bias current 100mA.



**Fig. 5-2**

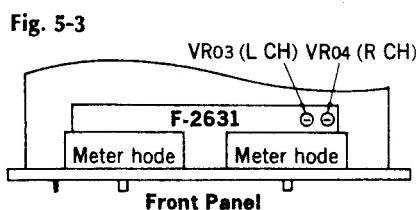


### 5-2. Power Meter Adjustments (See Fig. 5-3)

**Condition:**

1. Level Volume ..... Maximum
2. For this adjustment, run the unit for more than 2 minutes after turning on the power switch.

AUDIO OSCILLATOR		OUTPUT TERMINAL	ADJUST	ADJUST FOR
OUTPUT	CONNECTING POINT			
At 1kHz Sine wave, set the amplifier-output to 29.7V on both channels by adjusting O.S.C.-output level	Input terminal of Amplifier	Speaker terminal 8Ω VTVM Oscilloscope	VR03 (L-CH) VR04 (R-CH) on F-2631	Set the pointer of power meter to 0dB (110W) on both channels



## 5. ADJUSTMENTS

### 5-1. Bias Current Adjustment (See Fig. 5-1, 5-2)

**Condition:**

1. Room Temperature ..... 18°C~28°C (65°F~83°F)
2. Output Load (Speaker) ..... 8 ohms
3. A.C. Supply Voltage ..... Rated Voltage ±2%
4. Turn down the volumes, VR01, VR02 on F-2661 till minimum (counterclockwise)
5. Level Volume ..... Maximum
6. For this adjustment, run this unit for more than 3 minutes after turning on the power switch.

STEP	SUBJECS	AUDIO OSCILLATOR		OUTPUT TERMINAL	ADJUST	ADJUST FOR	REMARKS
		OUTPUT	CONNECTING POINT				
1	Distortion factors & Switching distortion adjustment	At 40kHz, Set the amplifier-output to 15V on both Channels by adjusting O.S.C. output level	Input terminal of amplifier	Speaker terminal 8Ω Oscilloscope Distortion Meter VTVM	VR01 (L-CH) VR02 (R-CH) on F-2661	Minimum point of Distortion factors & Switching distortion	To avoid temperature rise, complete the adjustment in a short time
2	Bias Current confirmation (no input signal)			D.C. Milliammeter	VR01 (L-CH) VR02 (R-CH) on F-2661	Confirm bias current to be within 100mA	Only being it over 100mA, Set it to 100mA

**Note:** After proceeding with Step 1, have a cooling off period, 5 to 10 minutes, to confirm the bias current.

In case of not having a distortion meter, complete the adjustment by Step 2 to obtain bias current 100mA.

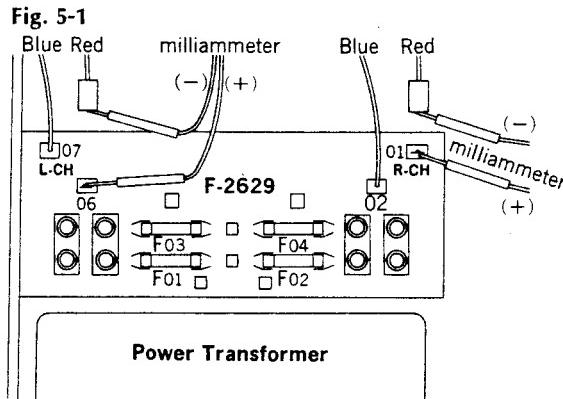
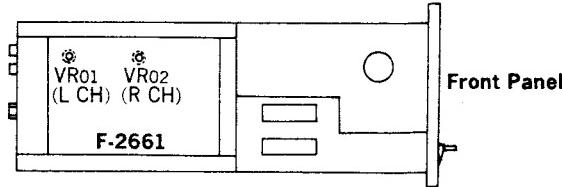


Fig. 5-2



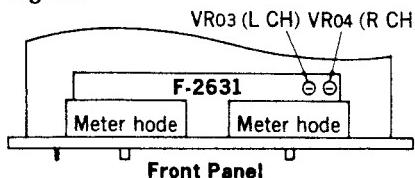
### 5-2. Power Meter Adjustments (See Fig. 5-3)

**Condition:**

1. Level Volume ..... Maximum
2. For this adjustment, run the unit for more than 2 minutes after turning on the power switch.

AUDIO OSCILLATOR	OUTPUT	CONNECTING POINT	OUTPUT TERMINAL	ADJUST	ADJUST FOR
At 1kHz Sine wave, set the amplifier-output to 29.7V on both channels by adjusting O.S.C.-output level		Input terminal of Amplifier	Speaker terminal 8Ω VTVM Oscilloscope	VR03 (L-CH) VR04 (R-CH) on F-2631	Set the pointer of power meter to 0dB (110W) on both channels

Fig. 5-3

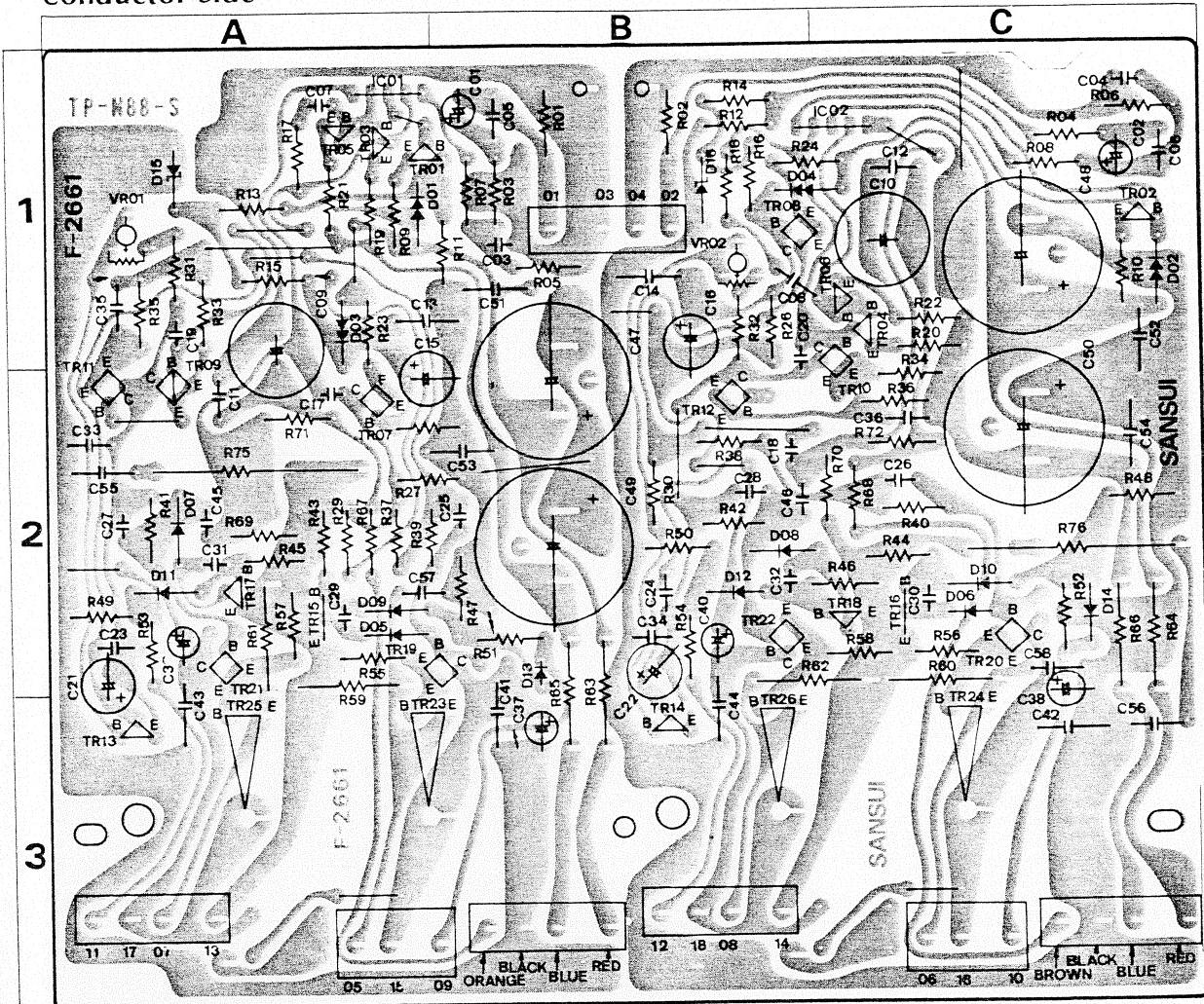


## **6. PARTS LISTS & PARTS LOCATION**

## **6-1. F-2661 Driver Circuit Board (Stock No. 7571501)**

Since some of capacitors and resistors are omitted from parts lists in this Service Manual, refer to the common parts list for capacitors & resistors which was appended previously to each Sansui Manual.

### **Conductor Side**

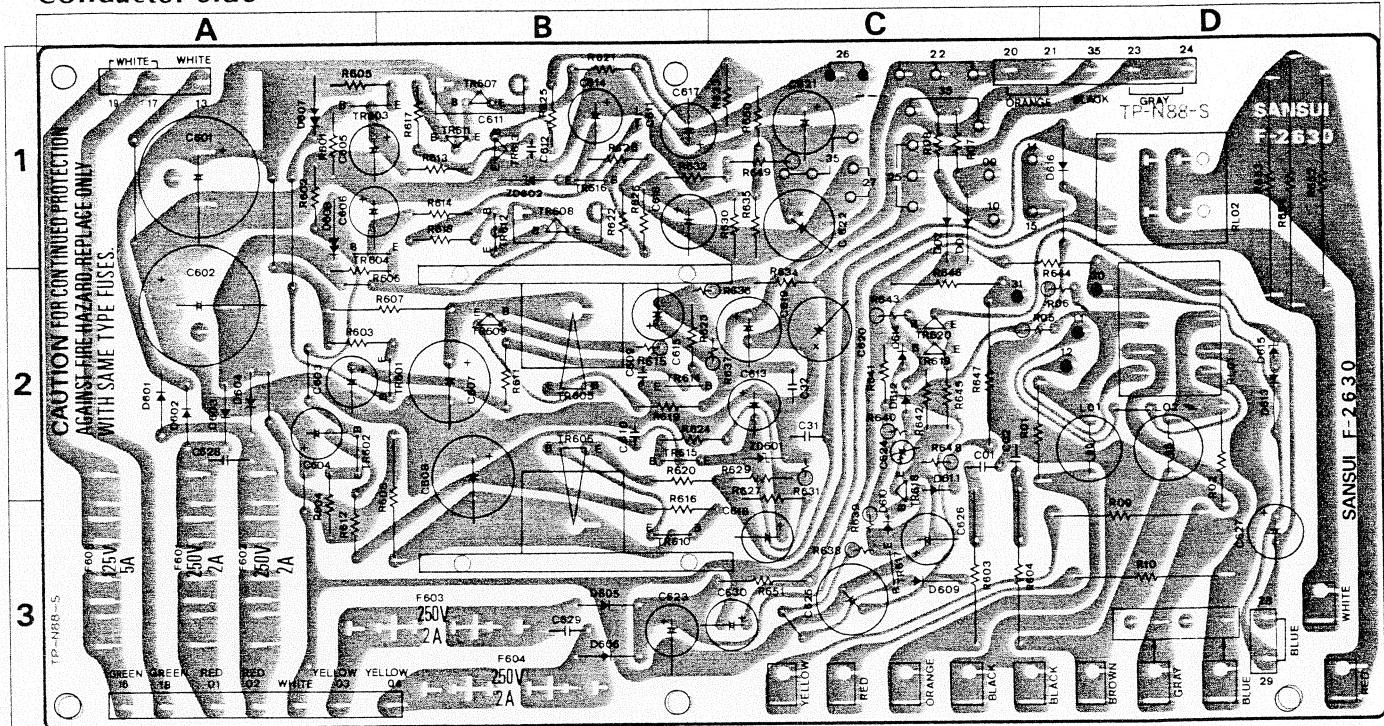


## **Parts List**

Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position
TR01, 02	0300680, 1	2SA733 (2) (P, Q)	Transistor	1A.B.1C	D07, 08	{ 0311160      1S2473D { 0311180      1S1588 }	2 A. 2 B
TR03, 04	0306260, 1	2SC1628 (O, Y)		1 A. 1 C	D09, 10	{ 0311160      1S2473D { 0311180      1S1588 }	2 A. 2 B
TR05, 06	0300700, 1	2SA818 (O, Y)		1 A. 1 C	D11, 12	{ 0211160      1S2473D { 0311180      1S1588 }	2 A. 2 B
TR07, 08	0306401, 2	2SC1904 (B, V)		2 A. 1 B	D13, 14	0340120      VD1212 Varistor	3 A. 3 B
TR09, 10	0305640, 1	2SC735 (O, Y)		2 A. 1,2C	C11, 12	0661250      25pF 50V C.C.	2 A. 1 C
TR11, 12	0300220, 1	2SA562 (O, Y)		2 A. 2 B	C47-50	0549301      470μF 80V E.C.	1, 2 B., C
TR13, 14	0306260, 1	2SC1628 (O, Y)		3 A. 3 B	R55, 56	0103560      56Ω	2 A. 2 C
TR15, 16	0300700, 1	2SA818 (O, Y)		2 C. 2 C	R57, 58	0103560      56Ω	2 A. 2 C
TR17, 18	0308441, 2	2SD382 (M, L)		2 A. 2 C	R59, 60	0103221      220Ω	½ W C.R.
TR19, 20	0303271, 2	2SB537 (M, L)		2 A. 2 C	R61, 62	0103221      220Ω	2 A. 2B, C
IC01, 02	0360370, 1	2SA798 (F, G) IC	1 A. 1 C	VR01, 02	1035290      470Ω(B) Volume	1 A. 1 B	
D01, 02	{ 0311160      1S2473D { 0311180      1S1588 }	Diode	1 A. 1 C		2410590      4P Pin Ass'y Type D		
D03, 04	0340120	VD1212 Varistor	1A.1B.C		2410680      4P Pin Ass'y Type F		
D05, 06	{ 0311160      1S2473D { 0311180      1S1588 }	Diode	2 A. 2 C		2410920      3P Pin Ass'y Type E		

## 6-2. F-2630 Power Supply Circuit Board for Driver Stage (Stock No. 7502091)

### Conductor Side

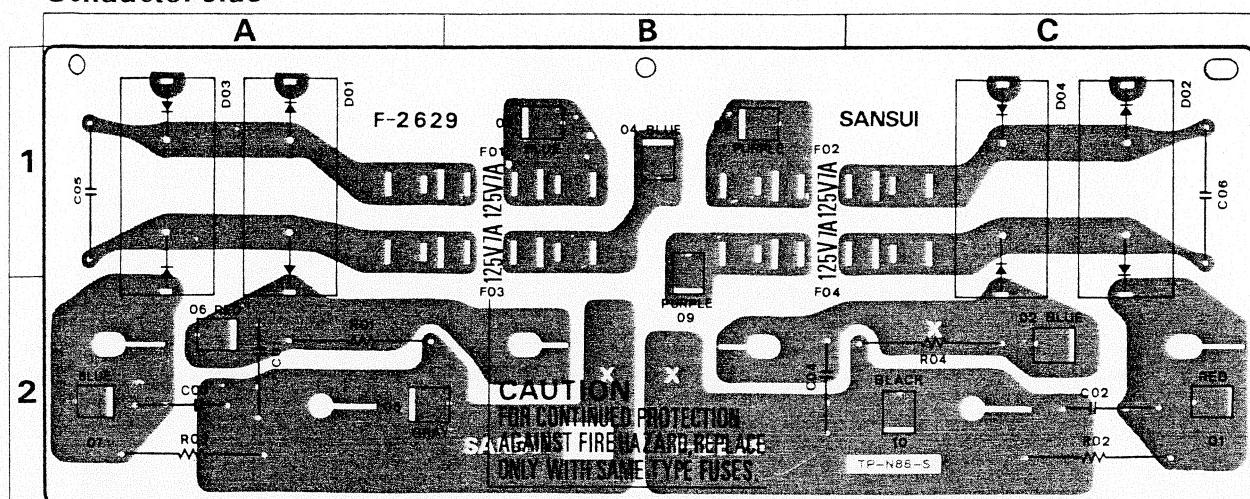


### Parts List

Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position
TR603	0300720, 1	2SA850 (C, D)	1 A, B	D612	{ 0311160 0311180	{ 1S2473D 1S1588	2 C
TR604	0306280, 1	2SC1735 (C, D)	1 A, B	D613	0310340	10D1	2 D
TR607	{ 0308450, 1 0308611, 2	{ 2SD356 (C, D) 2SD357 (D, E)	1 B	D614	{ 0311160 0311180	{ 1S2473D 1S1588	Diode 2 C
TR608	{ 0303280, 1 0303441, 2	{ 2SB526 (C, D) 2SB527 (D, E)	1 B	D615	0316530	RD27E (B)	2 D
TR611	0306280, 1	2SC1735 (C, D)	1 B	D616	0310340	10D1	1 D
TR612	0300720, 1	2SA850 (C, D)	Transistor 1 B	ZD602	0316310	RD-13E (B)	Zener Diode 1 B
TR613	0306290, 1	2SC1400 (E, U)	1 B	C601	0549301	470μF	80V E.C. 1 A
TR616	0300470, 1	2SA726 (W, F, G)	1 B	C602	0549301	470μF	80V E.C. 1, 2 A
TR617	0300511, 2	2SA733 (Q, R)	3 C	C628	0655103	10000 pF	500V C.C. 2 A
TR618	0306131, 2	2SC1364 (6, 7)	2, 3 C	C629	0655472	4700 pF	500V C.C. 3 B
TR619	0306131, 2	2SC1364 (6, 7)	2 C	R01, 02	0104479	4.7Ω	1 W C.R. 2 C, 2 D
TR620	0306131, 2	2SC1364 (6, 7)	2 C	R03, 04	0203100	10Ω	3 W M.R. 3 C
D01, 02	{ 0311160 0311180	{ 1S2473D 1S1588	1 C	R605, 606	0191471	10Ω	1/4 W F.R. 1 A, 2 A
D601	0310350	10D2	2 A	R621, 622	0191100	470Ω	1 B
D602	0310350	10D2	2 A	R644	0211471	470Ω	1 W M.R. 2 C, D
D603	0310350	10D2	2 A	R646	0202151	150Ω	2 W M.R. 2 C
D604	0310350	10D2	2 A	R647	0183471	470Ω	3 W Ce.R. 2 C
D605	0310340	10D1	3 B	R651	0211391	390Ω	1 W M.R. 3 C
D606	0310340	10D1	3 B	R652, 653	0137829	8.2Ω	7 W Ce.R. 1 D
D607	0340120	VD1212	Varistor 1 A	R655	0103182	1.8kΩ	1/2 W C.R. 2 D
D608	0340120	VD1212	1 A	L01, 02	4210290	Filter Coil	2 D
D609	0310490	SV-02	3 C	RL01	1150310	Relay	2 D
D610	{ 0311160 0311180	{ 1S2473D 1S1588	3 C	RL02	1150310	Relay	1 D
D611	{ 0311160 0311180	{ 1S2473D 1S1588	2 C	F601-604	0432240	A.C. Fuse	3 A, B
				F605	0432290	A.C. Fuse	3 A
					2410590	4P Pin Ass'y Tpey D	

### 6-3. F-2629 Power Supply Circuit Board (Stock No. 7502081)

#### Conductor Side

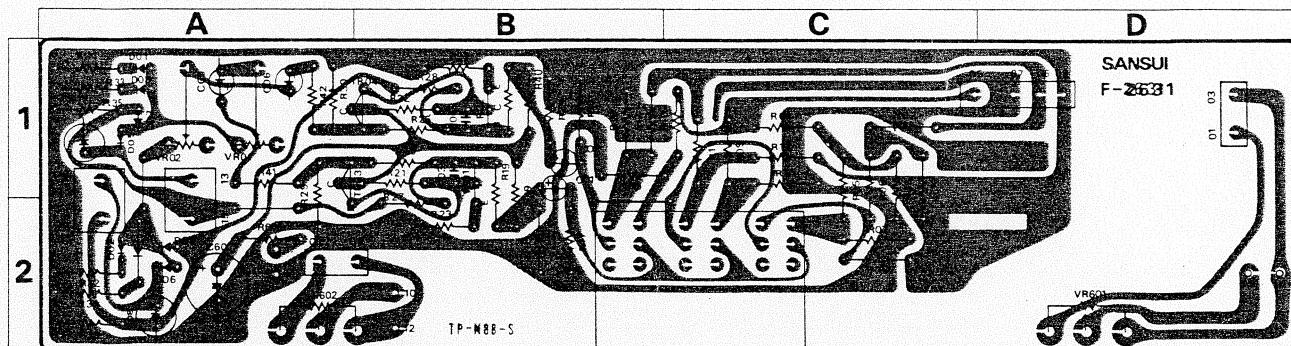


#### Parts List

Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position
D01	03111310	SS-5	1 A	C01, 02	0602109	1.0 $\mu$ F	2 A, 2 C
	03111540	S5151		C03, 04	0602109	1.0 $\mu$ F	2 A, 2 B
D02	03111310	SS-5	1 C	C05, 06	0605477	0.047 $\mu$ F 250V M.C.	1 A, 1 C
	03111540	S5151		R01, 02	0202332	3.3k $\Omega$	1 A, 1 C
D03	03111320	SS-5R	1 A	R03, 04	0202332	3.3k $\Omega$	1 A, 1 C
	03111550	S5151R		F01~04	0432500	AC Fuse	1, 2 B
D04	03111320	SS-5R	1 C				
	03111550	S5151R					

### 6-4. F-2631 Level Volume & Meter Circuit Board (Stock No. 7594521)

#### Conductor Side



#### Parts List

Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position
TR01, 02	0306070, 1	2SC1313 (F, G)	1 B	R601	0210102	1.0k $\Omega$ 1/2W M.R.	2 A
TR03, 04	0306070, 1	2SC1313 (F, G)	1 A, 1 B	VR01, 02	1000330	100k $\Omega$ (B)	1 A
D01, 02	03111160	1S2473D	1 A, 2 A	VR03, 04	1032410	200 $\Omega$ (B)	Volume
D03, 04	03111160	1S2473D	1 A, 2 A	S01	1131390	Push Switch	
D05, 06	03111160	1S2473D	1 A, 2 A		2410910	2P Pin Ass'y Type E	
D07, 08	03111160	1S2473D	1 A, 2 A				

**6-5. F-2514 Meter Lamp Circuit Board** (Stock No. 7594531)

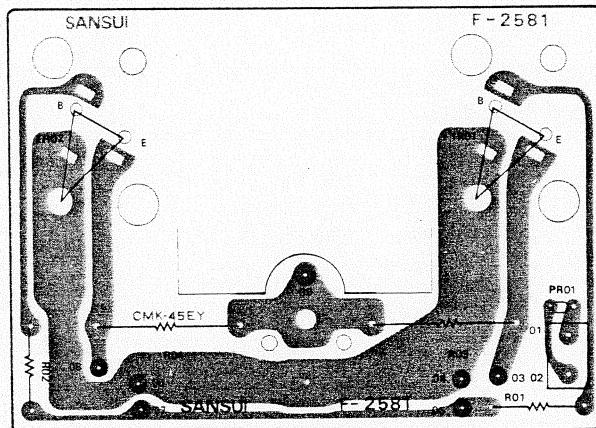
Conductor Side



Parts No.	Stock No.	Description
PL01-03	0420050	7V 0.3MA Lamp

**6-6. F-2581 Final Stage Circuit Board** (Stock No. (+) Side 7571491)  
(Stock No. (-) Side 7571511)

Conductor Side

**Parts List <+ Side>**

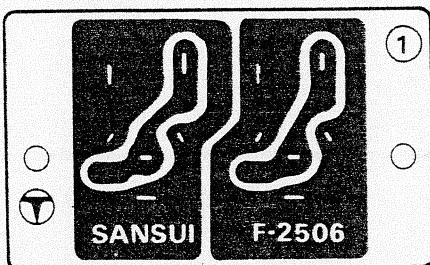
Parts No.	Stock No.	Description
TR01	0306451, 2	2SC1403A (O, Y)
TR02	0306451, 2	2SC1403A (O, Y)
R01	0103829	8.2Ω
R02	0103829	8.2Ω
R03	0135338	0.33Ω
R04	0135338	0.33Ω
2030040		Transistor Socket
2030040		Transistor Socket

**Parts List <- Side>**

Parts No.	Stock No.	Description
TR01	0300831, 2	2SA745A (O, Y)
TR02	0300831, 2	2SA745A (O, Y)
PR01	0320130	Thermistor
R01	0103829	8.2Ω
R02	0103829	8.2Ω
R03	0135338	0.33Ω
R04	0135338	0.33Ω
2030040		Transistor Socket
2030040		Transistor Socket
2410910		2P Pin Ass'y Type E

**6-7. F-2506 Input Terminal Circuit Board** (Stock No. 7594511)

Conductor Side

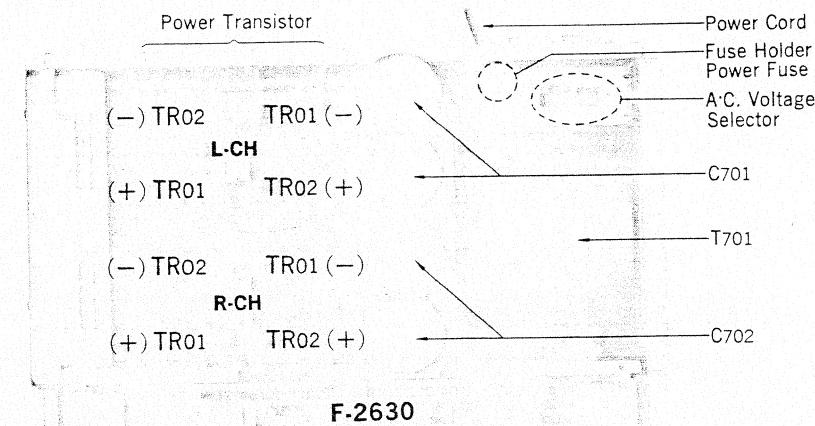
**Parts List**

Parts No.	Stock No.	Description
2430260		Jack
2430270		Jack

## 7. OTHER PARTS

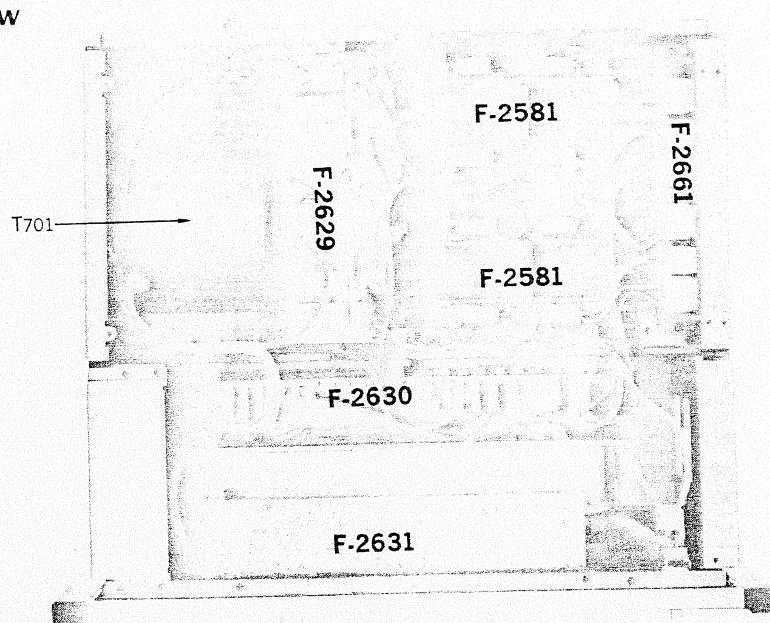
### 7-1. Top & Bottom View

#### Top View



F-2631

#### Bottom View

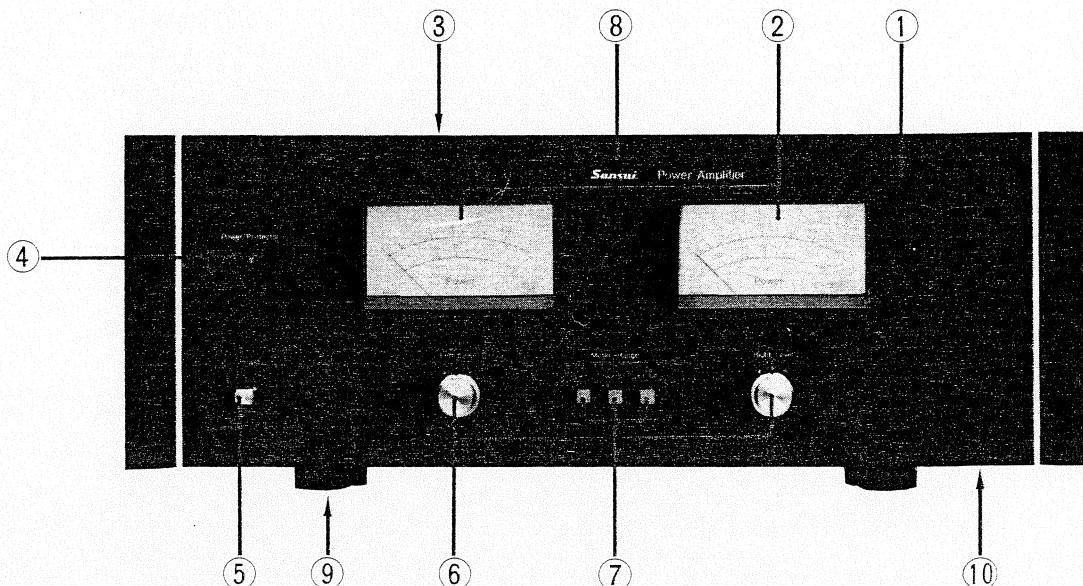


#### Parts List

Parts No.	Stock No.	Description
C701,702	0559519	E.C. 12000 $\mu$ F 63V
C703	0659801	C.C. 0.01 $\mu$ F 150V
R701	0203100	M.R. 10Ω 3W
R702	0203100	
T701	4002520	Power Transformer

Parts No.	Stock No.	Description
F701	0434060 0432290	Fuse 10A (100V/120V) Fuse 5A (220V/240V) { Power Fuse }
	2300060	Fuse Holder
	2410091	6P, AC Voltage Selector Plug
	2410830	10P, AC Voltage Selector Socket
	5268601	A.C. Voltage Adaptor Cover
	3800240	A.C. Power Cord

## 7-2. Front View



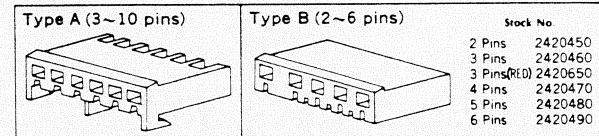
Parts No.	Stock No.	Description
1	7007410 4301040	Panel Ass'y Power Meter
2 M701,702	{ 5446230 5496030 5496040	Illumination Plate Meter glass Meter hode
3	5006620	Bonnet
4 LD701	7726140 [1170510	LED Ass'y Power protector Indicator Lever Switch, power
5 S701	[5326510 5286731	Knob Type E, Power Switch Lever Guide, Power

Parts No.	Stock No.	Description
6 VR01,02	{ 1000330 5318253	Level Volume 100kΩ (B)
	{ 1131390 5326531	Knob Type B, Level volume Push Switch Push Knob
7 S06	{ 5286721 6906480	Knob Guide, Push Switch Spring
8	5336581	SANSWI Mark
9	5517050	Leg
10	5058492	Bottom Plate

## 7-3. Figures

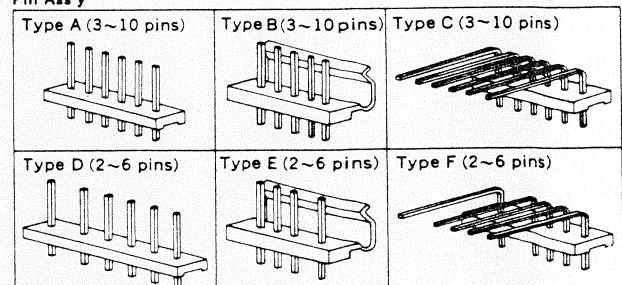
### Connectors & Pin Ass'y

#### Connectors



NOTE: Since stock number of female connectors (type B) with wires are not shown in each parts list of Complete circuit board, please refer to the above parts list when ordering the connector.

#### Pin Ass'y

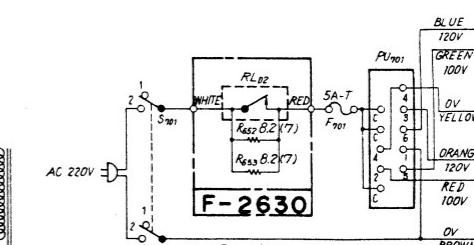
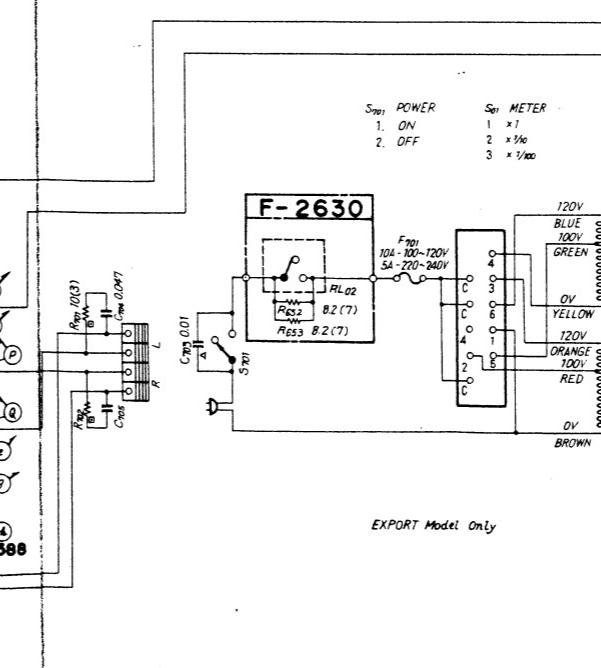
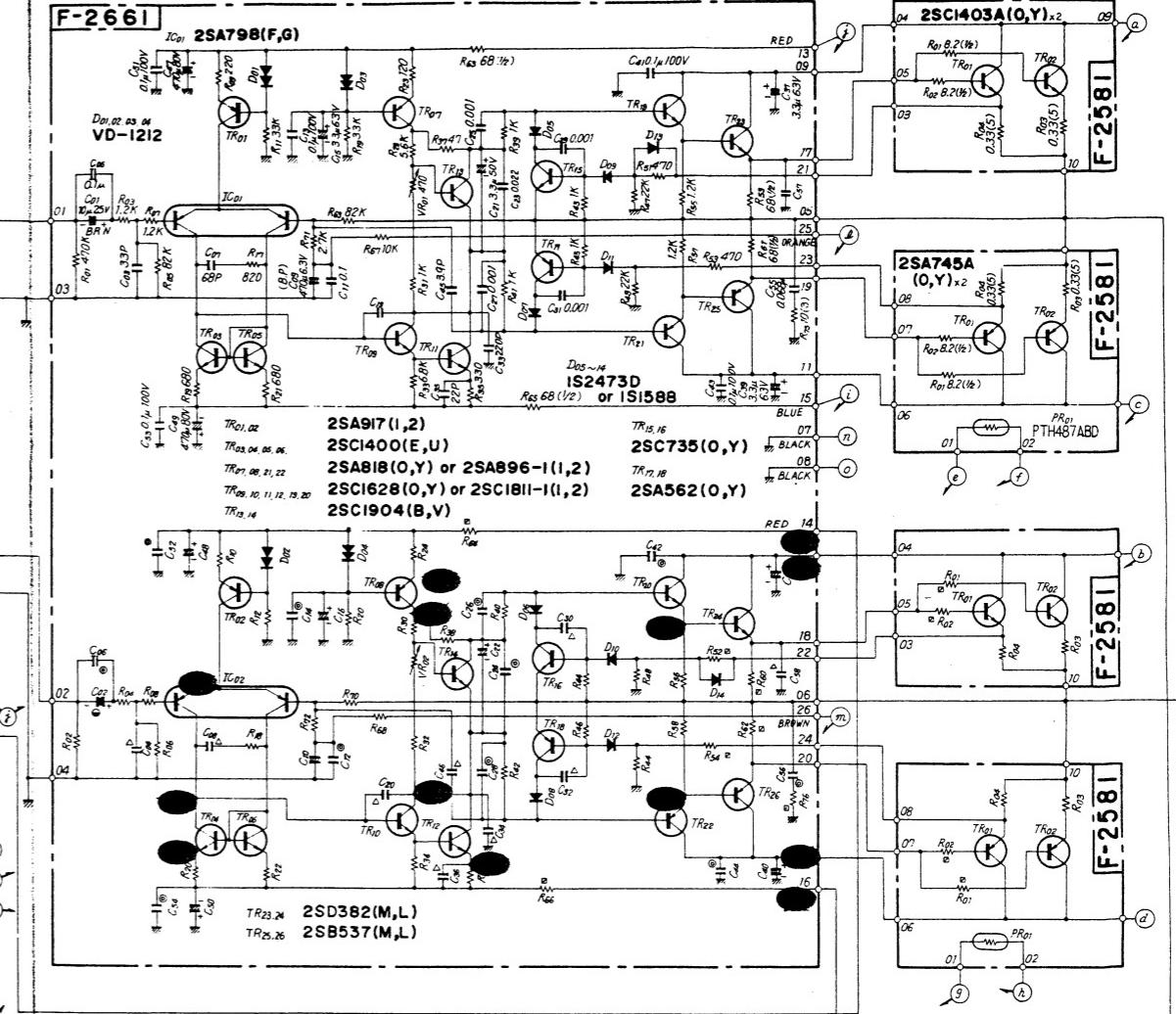
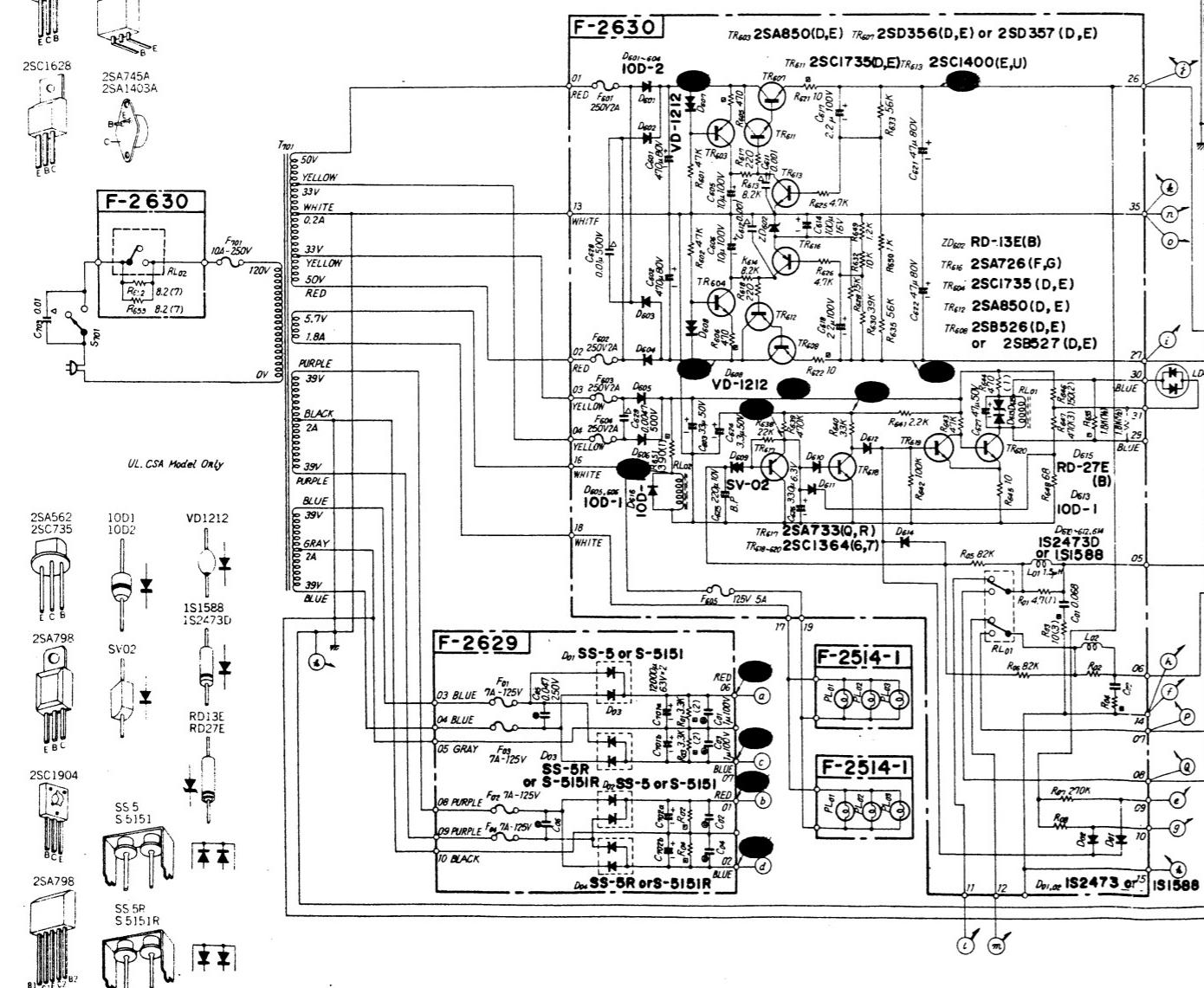
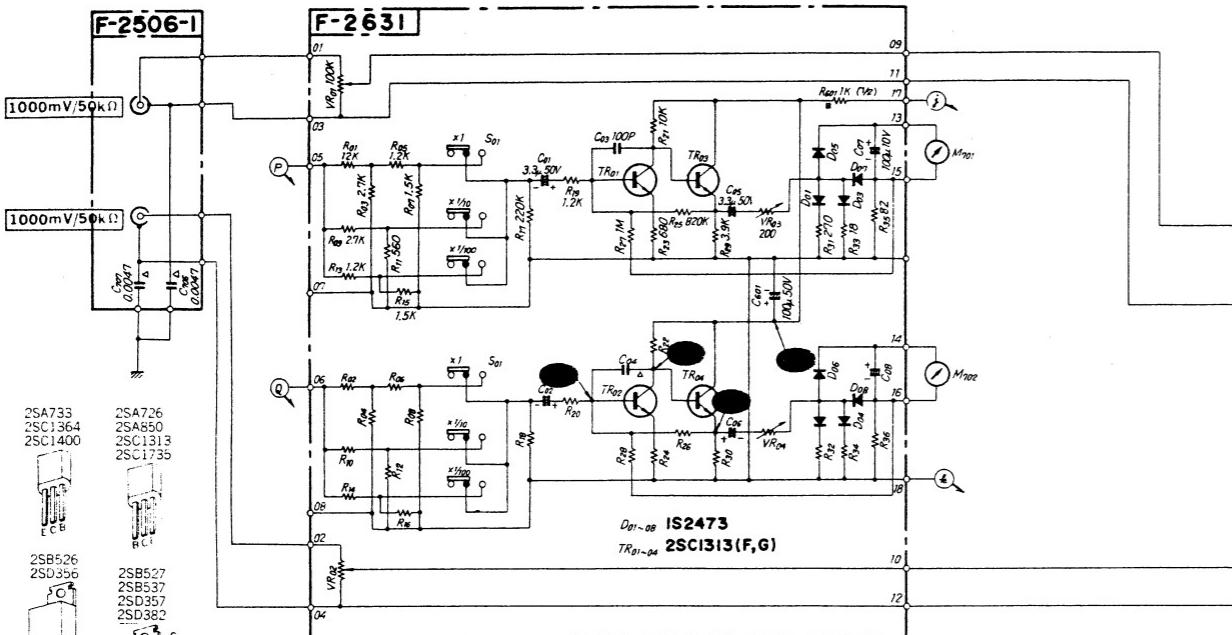


## Abbreviations

C.R. :	Carbon Resistor	E.C. :	Electrolytic Capacitor
S.R. :	Solid Resistor	BP.E.C.:	Bi-Polar Electrolytic Capacitor
Ce.R. :	Cement Resistor	C.C. :	Ceramic Capacitor
M.R. :	Metallized Film Resistor	Mi.C. :	Mica Capacitor
F.R. :	Fusing Resistor	O.C. :	Oil Capacitor
N.I.R. :	Non-Inflammable Resistor	P.C. :	Polystyrene Capacitor
M.C. :	Mylar Capacitor	T.C. :	Tantalum Capacitor

- La présentation et les spécifications sont susceptibles d'être modifiées sans préavis par suites d'améliorations éventuelles.
- Änderungen, die dem technischen Fortschritt dienen, bleiben vorbehalten.
- Design and specifications subject to change without notice for improvements.

## **8. SCHEMATIC DIAGRAM**



**SYMBOL**

- △ Ceramic
- ◎ Mylar
- Styrol
- (B.P.) Bi-Polar Electrolytic
- Low-Leak Electrolytic
- Fusing Resistor
- Non-Inflammable Resistor

**RESISTORS**  
 Are in ohms,  $\frac{1}{4}$  Watts,  $\pm 5\%$ , Tolerance  
 Unless Otherwise Noted K-kn, M-MQ

**CAPACITORS**  
 Are in  $\mu F$ , Unless Otherwise Noted P, p

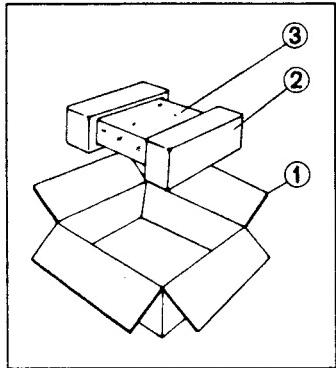
**TOLERANCE**  
 $J \pm 5\%$ ,  $G \pm 2\%$ ,  $F \pm 1\%$

**BIAS CURRENT** 100mA

**SPEAKERS** 110W+110W/8Ω  
 BOTH CHANNEL DRIVEN @ 100W

## 9. PACKING LIST

Parts No.	Stock No.	Description
1	9009300	Carton Case
2	9027911	Stylofoam Packing
3	9116051	Vinyl Cover



## 10. ACCESSORY PARTS LIST

Stock No.	Description
9202240	Operating Instruction
9237470	Schematic Diagram

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